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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/576,725	09/06/2006	Jin Mizuguchi	P29722	4363

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EXAMINER	
MA, JAMESON Q	

ART UNIT	PAPER NUMBER
1797	

NOTIFICATION DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/576,725	MIZUGUCHI, JIN	
	Examiner	Art Unit	
	JAMESON Q. MA	1797	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *26 February 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *20-29* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *20-29* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

2. Claim 28 is rejected under 35 U.S.C. 103(a) as being unpatentable over Abe et al. (US 4,313,338) in view of Eisele et al. (Sensors and Actuators B. Vol 78. Pages 19-25. 2001).

Regarding claim 28, Abe discloses a gas sensor, comprising a metal oxide film (see C4/L10-12), and wherein the resistance value of the gas-sensitive film can be measured (see C5/L48-58). Abe also discloses that the film may be a multi-layer film comprising a selection of films (see C4/L30-32).

Abe does not explicitly disclose an organic compound containing an introduced heterocycle comprising a nitrogen atom. Further, Abe does not explicitly disclose the organic compound is an organic pigment containing an introduced heterocycle comprising a nitrogen atom, and the organic pigment is a quinacridone, indigo, phthalocyanine, anthraquinone, indanthrone, anthanthrone, perylene, pyrazolone, perinone, isoindolinone, isoindoline, dioxazine, or a derivative thereof

Abe does not explicitly disclose the sensor in which protons are brought into contact with an organic compound. Abe also does not explicitly disclose the sensor wherein a change in electrical resistivity, photoconductivity, or optical absorption band for the organic compound accompanies proton addition to the organic compound.

Regarding limitations recited in claim 28 which are directed to protons and proton addition, it is noted that neither the manner of operating a disclosed device nor material or article worked upon further limit an apparatus claim. Said limitations do not differentiate apparatus claims from prior art. See MPEP § 2114 and 2115. Further, it has been held that process limitations do not have patentable weight in an apparatus claim. See Ex parte Thibault, 164 USPQ 666, 667 (Bd. App. 1969) that states "Expressions relating the apparatus to contents thereof and to an intended operation are of no significance in determining patentability of the apparatus claim."

Eisele teaches that both semiconducting metal oxides and polymer and organic films can be used as sensitive layers in gas detection devices (see Fig. 3). In particular, Eisele teaches that polypyrroles and phthalocyanines have been investigated for this purpose (see Paragraph 3.4. Polymers and Organic Films).

Abe and Eisele are analogous because both references are directed to gas sensing devices that utilize gas sensitive films.

It would have been obvious to one of ordinary skill in the art at the time of invention to substitute for or add to the metal oxide film as taught by Abe, a polypyrrole and/or phthalocyanine film as taught by Eisele, because doing so would amount to nothing more than the simple substitution of one known gas sensitive layer for another to obtain predictable results of gas sensing.

3. Claim 29 is rejected under 35 U.S.C. 103(a) as being unpatentable over Abe et al. (US 4,313,338) in view of Eisele et al. (Sensors and Actuators B. Vol 78. Pages 19-

25. 2001) as applied to claim 28 above, and further in view of Mizuguchi (Ber. Bunsenges. Phys. Chem. Vol 97. No 5. Pages 684-693. 1993).

Regarding claim 29, modified Abe discloses all of the claim limitations as set forth above.

While modified Abe teaches that an organic compound containing an introduced heterocycle comprising a nitrogen atom (pyrrole) can be used, it does not explicitly disclose the heterocycle comprising a nitrogen atom is a pyridine-based heterocycle.

Mizuguchi teaches that DPPP is a pyrrole that contains a pyridyl ring. Mizuguchi also teaches that protonation of DPPP in the solid state brings about significant changes in electrical resistivity (see Abstract).

Modified Abe and Mizuguchi are analogous because both references are directed to the use of pyrroles and their electrical resistivity.

It would have been obvious to one of ordinary skill at the time of invention to substitute for the polypyrrole film of modified Abe, DPPP as taught by Mizuguchi, because doing so would amount to nothing more than choosing from a finite number of identified, predictable pyrrole substances, with a reasonable expectation for success as a film with changing electrical resistivity properties.

4. Claims 20-22, 24, and 26-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Abe et al. (US 4,313,338) in view of Eisele et al. (Sensors and Actuators B. Vol 78. Pages 19-25. 2001), and further in view of DiMeo, Jr. et al. (US 2003/0153088).

Regarding claim 20, Abe discloses a gas sensor, comprising a metal oxide film (see C4/L10-12), and wherein the resistance value of the gas-sensitive film can be measured (see C5/L48-58). Abe also discloses that the film may be a multi-layer film comprising a selection of films (see C4/L30-32).

Abe does not explicitly disclose an organic compound containing an introduced heterocycle comprising a nitrogen atom. Further, Abe does not explicitly disclose a protonation catalyst in an islands-type arrangement, wherein the organic compound and the protonation catalyst contact each other.

Abe also does not explicitly disclose the sensor wherein a change in electrical resistivity, photoconductivity, or optical absorption band for the organic compound accompanies proton addition to the organic compound.

Regarding limitations recited in claim 20 which are directed to proton addition, it is noted that neither the manner of operating a disclosed device nor material or article worked upon further limit an apparatus claim. Said limitations do not differentiate apparatus claims from prior art. See MPEP § 2114 and 2115. Further, it has been held that process limitations do not have patentable weight in an apparatus claim. See Ex parte Thibault, 164 USPQ 666, 667 (Bd. App. 1969) that states "Expressions relating the apparatus to contents thereof and to an intended operation are of no significance in determining patentability of the apparatus claim."

Eisele teaches that both semiconducting metal oxides and polymer and organic films can be used as sensitive layers in gas detection devices (see Fig. 3). In particular,

Eisele teaches that polypyrroles and phthalocyanines have been investigated for this purpose (see Paragraph 3.4. Polymers and Organic Films).

Abe and Eisele are analogous because both references are directed to gas sensing devices that utilize gas sensitive films.

It would have been obvious to one of ordinary skill in the art at the time of invention to substitute for or add to the metal oxide film as taught by Abe, a polypyrrole and/or phthalocyanine film as taught by Eisele, because doing so would amount to nothing more than the simple substitution of one known gas sensitive layer for another to obtain predictable results of gas sensing.

Modified Abe does not explicitly disclose a protonation catalyst in an islands-type arrangement, wherein the organic compound and the protonation catalyst contact each other.

DiMeo teaches a hydrogen gas sensor comprising a thin-film sensor element that interacts with hydrogen to provide a correspondingly altered response characteristic such as electrical resistance (see Abstract). DiMeo also teaches the use of platinum catalytic islands deposited on top of the film to interact with the hydrogen to allow the hydrogen to be released from a parent molecule to that it can be sensed by a sensing surface (see Fig. 15 and [0174]).

Modified Abe and DiMeo are analogous because both references are directed toward gas sensing using thin film sensors. Specifically, both modified Abe and Dimeo are directed toward gas sensors capable of sensing hydrogen containing gases. Abe

discloses the detection of isobutane (C5/L8) and Dimeo discloses detection of hydrogen containing gases such as CH_4 and C_2H_6 (see [0172-0174]).

It would have been obvious to one of ordinary skill in the art at the time of invention to add to the film layer of modified Abe, the platinum catalytic islands of DiMeo, to allow for improved hydrogen gas detection in the instance that hydrogen gas was the target analyte as disclosed by both modified Abe and Dimeo.

Regarding claim 21, modified Abe discloses all of the claim limitations as set forth above. Additionally, modified Abe discloses the proton acceptance type gas sensor wherein at least one pair of electrodes is positioned in contact with a film (see Abe C3/L63-65) of the organic compound, and a change in electrical resistivity or photoconductivity can be detected (see Abe C5/L48-58).

Regarding claim 22, modified Abe discloses all of the claim limitations as set forth above. Additionally, modified Abe discloses the proton acceptance type gas sensor which is an element in which at least one pair of comb-shaped electrodes is positioned in an opposing arrangement on top of a substrate (see Abe C3/L56-58), a film of the organic compound is disposed thereon (see Abe C3/L63-65 and Eisele Fig. 3), and either a protonation catalyst contacts one surface or both surfaces of the film of the organic compound, or a protonation catalyst is distributed through the film of the organic compound (see DiMeo Fig. 15 and [0174]), wherein the sensor is an electrical resistance-mode sensor that detects changes in electrical resistivity between the electrodes (see Abe C5/L48-58).

Regarding claim 24, modified Abe discloses all of the claim limitations as set forth above. Additionally, modified Abe discloses a proton acceptance type gas sensor wherein a film of an organic pigment that acts as a sensitivity promoter is layered to either one surface or both surfaces of a film of the organic compound (see Eisele Fig. 3: phthalocyanine).

Regarding claims 26-27, modified Abe discloses all of the claim limitations as set forth above. Additionally, modified Abe discloses the proton acceptance type gas sensor wherein:

- the organic compound is an organic pigment containing an introduced heterocycle comprising a nitrogen atom (see Eisele Fig. 3: phthalocyanine).
- the organic pigment is a pyrrolo-pyrrole, quinacridone, indigo, phthalocyanine, anthraquinone, indanthrone, anthanthrone, perylene, pyrazolone, perinone, isoindolinone, isoindoline, dioxazine, or a derivative thereof (see Eisele Fig. 3: phthalocyanine).

5. Claim 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over Abe et al. (US 4,313,338) in view of Eisele et al. (Sensors and Actuators B. Vol 78. Pages 19-25. 2001), and further in view of DiMeo, Jr. et al. (US 2003/0153088) as applied to claims 20-22, 24, and 26-27 above, and further in view of Mizuguchi (Ber. Bunsenges. Phys. Chem. Vol 97. No 5. Pages 684-693. 1993).

Regarding claim 25, modified Abe discloses all of the claim limitations as set forth above.

While modified Abe teaches that an organic compound containing an introduced heterocycle comprising a nitrogen atom (pyrrole) can be used, it does not explicitly disclose the heterocycle comprising a nitrogen atom is a pyridine-based heterocycle.

Mizuguchi teaches that DPPP is a pyrrole that contains a pyridyl ring (see Abstract). Mizuguchi also teaches that protonation of DPPP in the solid state brings about significant changes in electrical resistivity.

Modified Abe and Mizuguchi are analogous because both references are directed to the use of pyrroles and their electrical resistivity.

It would have been obvious to one of ordinary skill at the time of invention to substitute for the polypyrrole film of modified Abe, DPPP as taught by Mizuguchi, because doing so would amount to nothing more than choosing from a finite number of identified, predictable pyrrole substances, with a reasonable expectation for success as a film with changing electrical resistivity properties.

6. Claims 20 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Eisele et al. (Sensors and Actuators B. Vol 78. Pages 19-25. 2001) in view of DiMeo, Jr. et al. (US 2003/0153088).

Regarding claim 20, Eisele discloses a polymer FET gas sensor (see Fig. 2b), comprising an organic compound containing an introduced heterocycle comprising a nitrogen atom (see Paragraph 3.4. Polymers and organic films: polypyrroles).

Eisele does not explicitly disclose the sensor comprising a protonation catalyst in an islands-type arrangement, wherein the organic compound and the protonation catalyst contact each other, and a change in electrical resistivity, photoconductivity, or

optical absorption band for the organic compound accompanies proton addition to the organic compound.

Regarding limitations recited in claim 20 which are directed to proton addition, it is noted that neither the manner of operating a disclosed device nor material or article worked upon further limit an apparatus claim. Said limitations do not differentiate apparatus claims from prior art. See MPEP § 2114 and 2115. Further, it has been held that process limitations do not have patentable weight in an apparatus claim. See Ex parte Thibault, 164 USPQ 666, 667 (Bd. App. 1969) that states "Expressions relating the apparatus to contents thereof and to an intended operation are of no significance in determining patentability of the apparatus claim."

DiMeo teaches a hydrogen gas sensor comprising a thin-film sensor element that interacts with hydrogen to provide a correspondingly altered response characteristic such as electrical resistance (see Abstract). DiMeo also teaches the use of platinum catalytic islands deposited on top of the film to interact with the hydrogen to allow the hydrogen to be released from a parent molecule to that it can be sensed by a sensing surface (see Fig. 15 and [0174]).

Eisele and DiMeo are analogous because both references are directed toward gas sensing using thin film sensors. Specifically, both Eisele and Dimeo are directed toward gas sensors capable of sensing hydrogen containing gases. Eisele teaches that palladium is known as highly sensitive to hydrogen gas, see P21/C2/Paragrapgh 3.1. and Dimeo discloses detection of hydrogen containing gases such as CH_4 and C_2H_6

(see [0172-0174]). Dimeo further discloses a hydrogen sensitive palladium layer in [0174].

It would have been obvious to one of ordinary skill in the art at the time of invention to add to the film layer of Eisele, the platinum catalytic islands of DiMeo, to allow hydrogen gas detection in the instance that hydrogen gas was the target analyte, as taught by both Eisele and Dimeo.

Regarding claim 23, modified Eisele discloses all of the claim limitations as set forth above. Additionally, modified Eisele discloses the sensor having a field-effect transistor structure in which a n+-Si substrate functions as a gate, source and drain electrodes are formed on top of the substrate with a silicon oxide insulating film disposed there between, and a film of the organic compound is formed on top of the silicon oxide and the electrodes (see Fig. 2b).

Response to Arguments

7. Applicant's arguments filed 2/26/2009 have been fully considered but they are not persuasive. Applicant submits that the examiner has not provided a reason to modify the metal oxide layer of Abe and combine it with Eisele and that there is nothing in Abe to suggest this combination. Further applicant asserts that the examiner has not met the burden under KSR to provide a reason why one skilled in the art would modify the metal oxide layer of Abe with a polypyrrole or phthalocyanine layer taught by Eisele. In response, the examiner respectfully asserts that the burden has been met to substantiate a rejection based upon simple substitution. The examiner has given a finding that the prior art contained a device which differed from the claimed device by

some simple substitution (metal oxide gas sensing layer as opposed to polypyrrole/phthalocyanine layer). The examiner has also provided a finding that the substituted components and their functions as gas sensing elements were well known and that one of ordinary skill in the art could have substituted one known element for another with the Eisele reference. The Eisele reference teaches on page 21 Paragraph 3 **Sensitive layers and reaction mechanisms** that "in principle, all chemically sensitive materials may be used independent of their electrical properties. In the following we present a selection of metals, metal oxides, hydrated salts, polymers and organic films which have been investigated by work function measurements." Eisele figure 3 also provides a graphic which further supports this finding.

The examiner notes applicant's assertion that there is no discussion in Eisele that would warrant a combination with DiMeo to provide platinum catalytic islands. However, as cited in the previous Office action, "DiMeo also teaches the use of platinum catalytic islands deposited on top of the film to interact with the hydrogen (see Fig. 15 and [0174]." Paragraph [0174] of DiMeo states that the catalytic islands release a hydrogen molecule from a parent gas molecule to be sensed by the underlying palladium layer. As Eisele additionally discusses the use of palladium layers to sense hydrogen as set forth above, the addition of the platinum catalytic islands of DiMeo would actually allow for the device of Eisele to sense more hydrogen-containing compounds. While applicant's assertion that Eisele does not provide a reason for combining the two references, such a reason is found in the secondary reference DiMeo, the most pertinent paragraph [0174] of which was cited in the prior office action.

Conclusion

8. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to JAMESON Q. MA whose telephone number is (571)270-7063. The examiner can normally be reached on M-R 8:30 AM - 7:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jill Warden can be reached on (571)272-1267. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

JM
April 15, 2009

/Jill Warden/
Supervisory Patent Examiner, Art Unit 1797